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10/748,058	12/30/2003	Rajesh Menon	MIT.10366	2135

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EXAMINER
DINH, JACK

ART UNIT	PAPER NUMBER
2873	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/748,058	MENON ET AL.	
	Examiner	Art Unit	
	Jack Dinh	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1203*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *DETAILED ACTION*.

DETAILED ACTION

Drawings

1. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the drawings contain hand-written marks. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 20, "said step of providing an array of sources" lacks antecedent basis.

Regarding claim 21, "said step of providing an array of directionally selectively elements" lacks antecedent basis. Claim 22 is rejected based upon the rejected base claim 21.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4-7, 11-19, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer et al. (US Patent 5,512,745) in view of So (US Patent 6,775,049).

Regarding claim 1, Finer (figure 1) is interpreted as disclosing an optical manipulation system comprising an array of focusing elements **6** and **7**, each of which focuses an electromagnetic energy beam into an array of focal spots in order to manipulate a plurality of samples on an adjacent substrate (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except that the electromagnetic energy beam is from an array of beamlet sources. However Finer discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of beamlet sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** that can split the single source **20** into an array of beamlet sources. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide this optical scheme that can split the single source **20** into an array of beamlet sources, for the purpose of using a single source rather than a plurality of sources to reduce power comsumption.

Regarding claims 2 and 7, So (figure 2A) is interpreted as further disclosing that the array of beamlet sources includes an array of micromirrors **32-34** or a spatial light modulator **30**.

Regarding claims 4-6, Finer is interpreted as further disclosing that the array of beamlet sources includes an array of light emitting diodes (col. 5, lines 32-33). Given such teaching, light emitting diodes, semiconductor lasers, or vertical cavity surface emitting lasers would be within the knowledge of one skilled in the art as substitution. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use any type of light sources, for application-specific purposes.

Regarding claim 11, Finer (figure 1) is interpreted as disclosing a parallel optical manipulation system comprising an array of focusing elements **6** and **7**, and a source, wherein the source is positioned to selectively direct electromagnetic energy toward the focusing element, and each focusing element is positioned to direct a focused beam toward a particle to be manipulated (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except that the electromagnetic energy beam is from an array of sources. However Finer discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** that can split the single source **20** into an array of sources. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide this optical scheme that can split the single source

20 into an array of sources, for the purpose of using a single source rather than a plurality of sources to reduce power comsumption.

Regarding claim 12, Finer (figure 1) is interpreted as disclosing a parallel optical manipulation system comprising an array of focusing elements **6** and **7**, and a source, wherein the source is positioned to selectively direct electromagnetic energy toward the focusing element, and each focusing element is positioned to direct a focused beam toward a particle to be manipulated (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except for an array of directionally selective elements. However Finer discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** comprises an array of directionally selective elements **32-34** that can split the single source **20** into an array of sources. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an array of directionally selective elements, for the purpose of using a single source rather than a plurality of sources to reduce power comsumption.

Regarding claims 13 and 14, So (figure 2A) is interpreted as further disclosing that the array of directionally selective elements includes an array of micromirrors **32-34** or a spatial light modulator **30**.

Regarding claim 15, So (figure 2A) is interpreted as further disclosing that the system further includes a single source **20** of electromagnetic energy that is directed toward the array of directionally selective elements.

Regarding claim 16, So (figure 2A) is interpreted as further disclosing that the directionally selective elements may each be used to selectively switch on **32** and off **34** the electromagnetic energy that is directed toward a respective focusing element.

Regarding claim 17, Finer (col. 5, lines 32-36) in view of So (figure 2A) is interpreted as further disclosing that the directionally selectively elements are each associated with a focusing element, and the directionally selective elements may each be used to selectively (on **32** and off **34**) move with respect to an associated focusing element, wherein the electromagnetic energy is directed toward the associated focusing element.

Regarding claim 18, Finer (figure 1) is interpreted as disclosing a parallel optical manipulation system for manipulating particles using electromagnetic energy, the system comprising an array of focusing elements **6** and **7**, and a source, wherein the source is positioned to direct electromagnetic energy toward selectable locations on the focusing element (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except for an array of micro-mirrors each of which is associated with a focusing element and may be moved with respect to the associated focusing element to selectively direct a beamlet of electromagnetic energy toward a plurality of selectable locations on the focusing element. However Finer

discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** comprises an array of micromirrors **32-34** that can split the single source **20** into an array of beamlets, each of which can be used to selectively (on **32** and off **34**) move with respect to an associated focusing element, wherein the electromagnetic energy is directed toward the associated focusing element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an array of micromirrors, for the purpose of using a single source rather than a plurality of sources to reduce power comsumption.

Regarding claim 19, Finer (figure 1) is interpreted as disclosing a method of manipulating particles using electromagnetic energy, the method comprising the steps of providing an electromagnetic source that are directed toward an array of focusing elements **6** and **7**, focusing each of the beamlets toward a plurality of particles, and controlling each of the beamlets to manipulate the plurality of particles (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except for an array of beamlets and that the controlling of the beamlets is selective. However Finer discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** comprises an array of micromirrors **32-34** that can split the single source **20** into an array of beamlets, each of which can be used to selectively (on **32** and off **34**) move with respect to an associated focusing element, wherein the electromagnetic energy is directed toward the

associated focusing element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an array of micromirrors for the purpose of using a single source rather than a plurality of sources to maintain a relatively small size for the device, and to selectively controlling the array of beamlet of control the operation of each individual particle.

Regarding claim 23, Finer (figure 1) is interpreted as disclosing a method of manipulating particles using electromagnetic energy, the method comprising the steps of providing an electromagnetic source that are directed toward an array of focusing elements **6** and **7**, focusing each of the beamlets toward a plurality of particles **91**, and controlling each of the micromirrors to manipulate the plurality of particles (col. 5, lines 17-36). Finer is interpreted as disclosing all the claimed limitations except for an array of micromirrors and that the controlling of the beamlets is selective. However Finer discloses the teaching that, alternatively, one laser source may be used with an optical scheme that will split the single laser beam into an array of sources. Within the same field of endeavor, So (figure 2A) is interpreted as disclosing an optical scheme **30** comprises an array of micromirrors **32-34** that can split the single source **20** into an array of beamlets, each of which can be used to selectively (on **32** and off **34**) move with respect to an associated focusing element, wherein the electromagnetic energy is directed toward the associated focusing element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an array of micromirrors for the purpose of using a single source rather than a plurality of sources to maintain a relatively small size for the

device, and to selectively controlling the array of beamlet of control the operation of each individual particle.

Regarding claim 24, Finer (figure 1) is interpreted as further disclosing that the manipulation of the plurality of particles involves stretching an element that includes at least two particles (see figure 1 and col. 5, lines 17-36).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finer et al. (US Patent 5,512,745) in view of So (US Patent 6,775,049), as applied in claim 1, and further in view of Te Kolste et al. (US Patent 6,864,980).

Regarding claim 3, Finer in view of So is interpreted as disclosing all the claimed limitations, as described above, except that the array of focusing elements includes an array of diffractive elements. However, diffractive elements are well known as focusing elements. Within the same field of endeavor, Te Kolste is interpreted as disclosing this teaching (col. 4, lines 66-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diffractive, as taught by Te Kolste, for focusing purpose.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finer et al. (US Patent 5,512,745) in view of So (US Patent 6,775,049), as applied in claim 1, and further in view of Shie et al. (US Patent 6,266,476).

Regarding claim 8, Finer in view of So is interpreted as disclosing all the claimed limitations, as described above, except that the array of focusing elements includes an array of

Fresnel lenses. However, Fresnel lenses are well known as focusing elements. Within the same field of endeavor, Shie is interpreted as disclosing this teaching (col. 5, lines 65-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the Fresnel lenses, as taught by Shie, for focusing purpose.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finer et al. (US Patent 5,512,745) in view of So (US Patent 6,775,049), as applied in claim 1, and further in view of Mandella et al. (US Patent 5,887,009).

Regarding claim 9, Finer in view of So is interpreted as disclosing all the claimed limitations, as described above, except that the array of focusing elements includes an array of zone plates. However, zone plates are well known as focusing elements. Within the same field of endeavor, Mandella is interpreted as disclosing this teaching (col. 10, lines 48-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the zone plates, as taught by Mandella, for focusing purpose.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finer et al. (US Patent 5,512,745) in view of So (US Patent 6,775,049), as applied in claim 1, and further in view of Zhang (US Patent 6,373,868).

Regarding claim 10, Finer (figure 2) is interpreted as further disclosing that the system further includes a collimating lens **12** interposed between the source **8** and the focusing elements **13** (col. 6, line 16). Finer in view of So is interpreted as disclosing all the claimed limitations, as described above, except that the collimating lens is an array of microlens. However, microlens

are well-known to serve as collimating lens. Within the same field of endeavor, Zhang is interpreted as disclosing an array of microlense serving as two-dimensional collimating lens (col. 24, lines 20-22). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the microlense array, as taught by Zhang, for collimating purpose.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Dinh whose telephone number is 571-272-2327. The examiner can normally be reached on M-F (9:30 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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